DOCUMENT RESUME

ED 401 467 CE 073 006

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TITLE Junior College Students' Work-based Experiences in Taiwan.
PUB DATE Dec 96
NOTE 12p.; Paper presented at the American Vocational Association Convention (Cincinnati, OH, December 5-8, 1996).
PUB TYPE Reports - Research/Technical (143) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Case Studies; *Cooperative Education; *Education Work Relationship; Foreign Countries; Outcomes of Education; Program Effectiveness; Program Evaluation; School Business Relationship; *Technical Education; Technical Institutes; Two Year Colleges; Vocational Education; *Work Experience Programs
IDENTIFIERS *Mingchi Institute of Technology (Taiwan)

ABSTRACT

The cooperative education program at the Mingchi Institute of Technology, a 5-year technical junior college in Taiwan, is often praised as an exemplary model. Mingchi has implemented cooperative education in cooperation with Formosa Plastics Group (FPG) for more than 30 years. The school year at the college is structured with the winter and summer breaks shortened so that in each school year students can be divided into 4 groups to take turns in a 3-month paid work-based study program at the FPG. During their 5 school years, students completed a total of 15 months of off-campus study. A survey completed in 1990 by nearly 500 Mingchi students, graduates, supervisors, and heads of cooperating units found that helping students to comprehend workplace practices was considered the most valuable part of the program. The survey also found that 98 percent of the college's graduates were employed within 6 months after graduation. In 1996, a review of literature was conducted and case studies of student work-based experiences were analyzed based on interviews with two students majoring in industrial design and their supervisor. The study concluded that Mingchi's off-campus study program is efficient. The program reaches its preset goal of helping all students to learn by working, and in addition, the program is perceived to be effective. The program could be improved if the college and its partners could arrange more profession-oriented and more individualized work-based learning opportunities in the off-campus study program. In order to expand opportunities for professional training, cooperating firmst other than FPG companies should get involved. (Author/KC)

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ED 401 467

Running head: WORK-BASED EXPERIENCE

Junior College Students' Work-based Experiences in Taiwan

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Paper presented at
American Vocational Association (AVA) Annual Convention,
Cincinnati, Ohio, U.S.A.
December 5-8, 1996

CE073004

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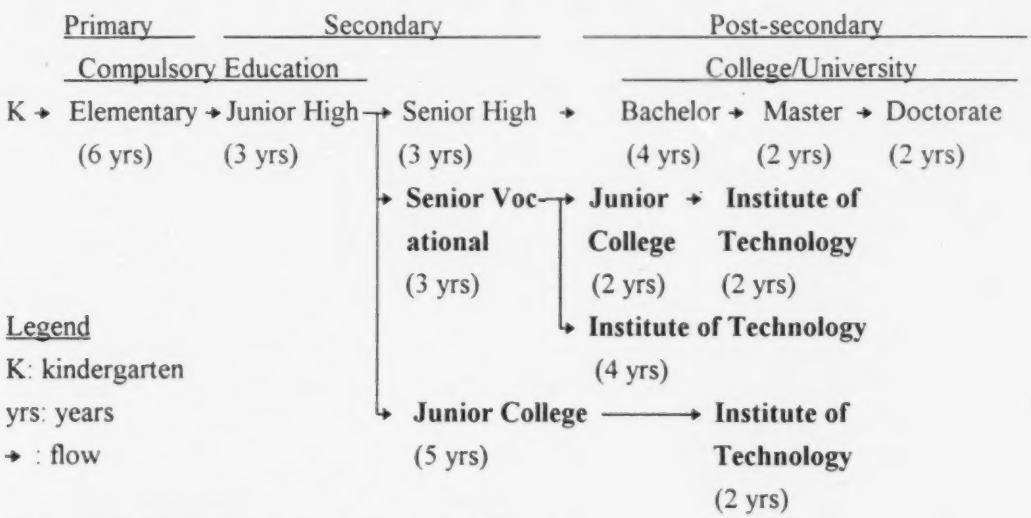
Abstract

The cooperative education program provided at the Mingchi Institute of Technology, a prominent five-year technical junior college in Taiwan, is often praised as an exemplary model. The winter and summer breaks at Mingchi are shortened so that in each school year the students may be divided into four groups to take turns taking part in a three-month paid work-based study program at the Formosa Plastic Group. A survey study completed in 1990 pointed out that helping students to comprehend workplace practices was considered the most valuable merit of the program. This paper describes the cooperative education program and further analyzes two cases of student work-based experiences based on interviews with two students, whose majors were industrial design, and their supervisor. Based on a review of the literature and the interviews, it is concluded that Mingchi's off campus study program is efficient. This more than 30-year-old program reaches its pre-set goal of helping all students to learn by working. In addition, from a perspective of effectiveness, Mingchi's off campus study program is on the right track. However, students will learn more and better if Mingchi and its partners may arrange more profession-oriented and more individualized work-based learning opportunities in the off campus study program.

Junior College Students' Work-based Experiences in Taiwan

The current school system in the Republic of China on Taiwan (hereafter, called Taiwan), as shown in Figure 1, is based upon the 6-3-3-4 system: six years in elementary school, three years in lower-secondary (i.e., junior high) school, three years in upper-secondary (i.e., senior high school or senior vocational) school, and normally four years in college or university. Senior vocational schools, junior colleges, and institutes of technology essentially constitute the technological and vocational education (TVE, synonymous with vocational-technical education — VTE) institutions. A junior-high-school graduate's three main routes to advanced study are senior high school, senior vocational school and five-year junior college. TVE in Taiwan has often been commended for its all-through (upper-secondary to post-secondary) system. This system is considered as the mix of the American and European VTE systems.


Primary
Secondary
Post-secondary
Compulsory Education
College/University
K → Elementary → Junior High → Senior High → Bachelor → Master → Doctorate
(6 yrs) (3 yrs) (3 yrs) (4 yrs) (2 yrs) (2 yrs)
→ Senior Vocational (3 yrs) → Junior College (2 yrs) → Institute of Technology (2 yrs)
→ Institute of Technology (4 yrs)
→ Junior College (5 yrs) → Institute of Technology (2 yrs)
Legend
K: kindergarten
yrs: years
→ : flow

Note: **TVE institutions** are shown in **boldface** type.

Figure 1. The school system in Taiwan.

In Unesco's Revised Recommendation concerning Technical and Vocational Education, at least the following two recommendations regarding cooperative education are made:

> Technical and vocational education as preparation for an occupational field should provide the foundation for productive and satisfying careers and should ... at the time offer a through and specialized preparation for initial employment and effective training within employment. (Principle 25)
>
> Enterprises should be closely associated in the practical training of those preparing

> for occupations in their particular sector, and should be encouraged to take responsibility, in cooperation with educational institutions, for the organization of this training. (Principle 35)

In Taiwan, cooperative education is also often advocated by vocational educators. As defined by the Practitioners Committee of the National Commission for Cooperative Education (NCCE, 1995/1996), cooperative education is "a structured educational strategy integrating classroom studies with learning through productive work experiences in a field related to a student's academic or career goals."

When school-to-work (STW) programs were urged in the United States, the common features of good STW programs, including work-based experience, were discussed in the field of vocational-technical education in Taiwan. Students enrolled in school-to-work (or school-to-careers) programs must be assured of a meaningful work experience through job shadowing, cooperative education, and internships or projects which introduce him/her to the realities of the world of work (Phillips, 1995). This recommendation led some vocational educators in Taiwan to examine whether the cooperative education programs implemented in the TVE system in Taiwan are effective or not.

The cooperative education program provided at the Mingchi Institute of Technology (明志工專, in Chinese; henceforth, called Mingchi) is often praised as an exemplary model for junior colleges in Taiwan. In order to learn from and share the Mingchi experience, this paper describes the cooperative education program and analyzes two cases of work-based experience based on interviews with two students and their supervisor. However, it should be noted that the official "institutes of technology" (技術學院, in Chinese) shown in Figure 1 offer baccalaureate programs. As with many other junior colleges in Taiwan, Mingchi is called an "institute of technology," but as a matter of fact Mingchi is a technical junior college which does not offer any baccalaureate programs.

Mingchi Has Implemented An Off Campus Study Program for More Than 30 Years

Located in metropolitan Taipei, Mingchi was established by Y. C. Wang, President of the Formosa Plastics Group (FPG), in 1964. Admitting junior-high-school graduates, Mingchi aims to prepare backbone technicians for Taiwan's industry. "Diligence, Perseverance, Frugality, and Trustworthiness" (勤勞樸實， in Chinese) are Mingchi's motto.

Currently, Mingchi consists of the following five departments: mechanical engineering, electrical engineering, chemical engineering, industrial engineering and management, and industrial design. Every year, these departments, respectively, recruit one to two classes (or 40 to 100) of students. Thus, in total, Mingchi has 40 classes of students. Each class

usually comprises about 40 students. Mingchi has more than 7,000 alumni. About one-fourth of these alumni work for FPG, which is involved in developing the electronics industries, power plants, the sixth naphtha cracking complex, heavy industry machinery, the Asia-Pacific technology center, etc. In recent years, FPG has supported aboriginal education and training. Mingchi began to recruit aboriginal youth in the 1996 autumn semester and will provide for aboriginal people supplemental senior vocational programs in 1997.

There are about 1,700 students in Mingchi. All the students are male and are required to reside in the dormitories on campus. Every morning, they get up at six o'clock, prepare for their classes, clean up the campus, attend a flag-raising ceremony, or exercise. During the evening hours, students are required to study by themselves in their dormitory rooms, and the student chiefs keep discipline in the dormitories. Guidance is mainly given by class mentors who stay with their students from morning till night (Mingchi, 1995).

In order to encourage its students to learn by working, and to acquire practical experience and professional knowledge, Mingchi has implemented cooperative education in cooperation with FPG for more than 30 years, ever since the establishment of the school. Mingchi's cooperative education has centered around off campus study programs.

According to the off campus study program, all winter and summer breaks are shortened so that, in each school year, students can be divided into four groups to take turns participating in a three-month, off campus, and in-plant study program. Successful completion of off campus study is a requirement for graduation. During their five school years, students must complete a total of 15 months of off campus study. During this study period, the students receive wages from the companies where they work. Their monthly wages are around NT$ 15,400 to 20,500 (equivalent to about US$ 570 to 760). These wages help students to pay for their tuition and fees, foster a spirit of independence, and help relieve the economic burden on their families.

According to a Mingchi report (Mingchi Institute of Technology, 1995), the students are placed in various companies associated with FPG or other cooperating firms during their off campus study period. Their learning tasks include operation and maintenance of machinery, cartography, repair of electrical equipment, maintenance of air-conditioning equipment, disposal of waste water, material testing, receiving and shipping of materials, management of stockrooms, production of samples, design of special projects, on-the-spot assembling, general affairs, research and development, etc. Students' learning tasks may or may not match students' majors. If they do, the experience is called "professional training." If not, it is called "general training." Among the five departments in Mingchi, it is most difficult for students in the Industrial Design Department to be placed in a professional

training job at FPG. The main reason is that FPG has mainly centered on the chemical industry.

Mingchi and its partners (i.e., firms) have implemented the off campus study program based on a mutual-benefit, win-win relationship. Table 1 summarizes the organization of students' off campus study. As shown in Table 1, beginning this year, supervisors from Mingchi are additionally required to visit cooperating units for a total of three days in each off campus study period to conduct in-depth supervision and to learn from the workplace. The Student Chiefs are usually outstanding senior students. They are assigned by Mingchi based upon "one plant area, one student chief" or "one large plant area (which may cover several of FPG's companies), one student chief with one to two deputy student chief(s)." In addition, the mentors, based upon "one plant area, two to three mentors," are usually chiefs or Mingchi alumni who are good at human resource development.

Figure 2 shows the procedure for implementation of the off campus study program. The first step--coordination with plant areas and practice jobs--is usually completed at least one month before students are, respectively, assigned in a practice job. When the students in each class are informed about their practice jobs, they discuss and negotiate with each other to reach the result of "one person, one job." Mingchi basically requires a student to change his cooperating unit each year.

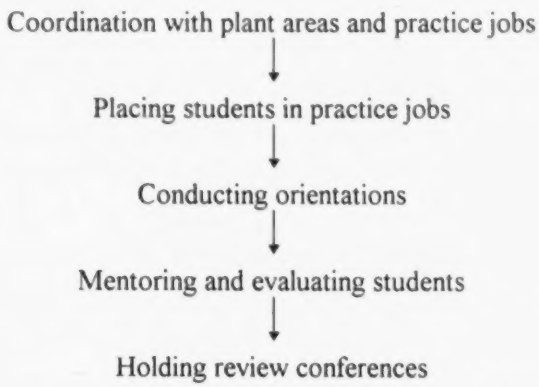

Coordination with plant areas and practice jobs
Placing students in practice jobs
Conducting orientations
Mentoring and evaluating students
Holding review conferences

Figure 2. The implementation procedure for the off campus study program.

Table 1

A Summary of the Organization for the Off Campus Study Program.

Mingchi	FPG
1. Internship and Employment Guidance Office -to take responsibility for off campus study administration. 2. Student Affairs Office -to monitor and guide student conduct. 3. Supervisor -to explore the general conditions of workplaces in cooperating firms. -to inform students of Mingchi's new off campus study policies and opportunities. -to visit the administration department heads and mentors of cooperating firms in order to learn about students' general performance. -to visit on-site heads of cooperating units in order to learn about students' practice performance. -to provide deviant students with specific guidance. 4. Student Chief -to guide other students in reporting to cooperating units. -to monitor other students evening study and enrich their spare-time activities. -to learn about other students' in-plant study situations and to take roll in the morning and in the evening. -to play the role of coordinator between Mingchi, cooperating units and other students. -to serve other students at the request of Mingchi and heads of cooperating units.	1. Office for General Administration -to coordinate and provide Mingchi with cooperating units. -to review the effectiveness of the off campus study program. 2. Administration Department -to place students in cooperating units. -to take responsibility for student attendance, participation, safety and hygiene training, evaluation, and related affairs. 3. Cooperating Unit -to take responsibility for job placement, training, mentoring, and evaluation. 4. Mentor -to provide students with comprehensive guidance and provide deviant students with specific guidance. -to deal with students' problems with heads of cooperating units. -to organize interim and final conferences to respond to student questions and comments.

Mingchi Work-based Experiences Aid School-to-career Transition

An educational program should be efficient and effective if we want it to actually facilitate student learning. In 1990, Mingchi's former president and others completed a survey study (Chou et al., 1990) carried out to investigate the effectiveness of Mingchi's off campus study system. From analysis of questionnaires, 150 from Mingchi graduates, 210 from Mingchi students, 41 from Mingchi supervisors, and 88 from heads of cooperating units, the main findings of that study were as follows: (1) Most people, especially Mingchi graduates, viewed positively the off campus study program. (2) Helping students to comprehend workplace practices was considered the most valuable merit of the program. (3) The following three responses pointed out the most important factors determining whether the off campus study program was effective or not: (a) Mingchi graduates and supervisors pointed out the extent of students' comprehension of workplace practices. (b) Mingchi students suggested students' comprehension of social phenomena and appreciation of life. (c) Mingchi supervisors urged the appropriateness of the program itself. That study also found that 98% of Mingchi graduates were employed within a half year after graduation, and that only about 14% of the graduates had changed jobs more than three times.

Smith (1995) urged that evaluation of a school-to-work program should provide answers to the following three questions: (1) Does the program work? (2) Is the program efficient? (3) Is the program relevant? Obviously, the former two questions can be linked to efficiency, and the third question can be connected to effectiveness (see Figure 3).

Figure 3. An illustration of efficiency and effectiveness.

In order to further explore the efficiency and effectiveness of Mingchi students' work-based experiences through the off campus study program, the authors interviewed two Mingchi seniors, whose majors were industrial design, and their supervisor in November of 1996. Because this is a case study, the authors do not suggest that the study

results can be generalized to the population.

Mingchi's Industrial Design Department aims to prepare industrial designers who demonstrate creativity and development competencies, and are able to engage in product planning, development and design. The courses offered emphasize practice and articulation. Four fields of specialty courses include: (1) product design and capstone-project design, (2) engineering and technology, (2) design fundamentals and presentation techniques, and (4) design theories and methodology (Mingchi Institute of Technology, 1996). At present, there are 170 students and 10 specialty full-time faulty members. Every year, the fifth year students of the department participate in an annual intercollegiate design exhibition to promote design ideas and to learn from each other. Most of the design projects carried out by the fourth and fifth year students are sponsored by local companies. In 1986, the department established the Design Service Center to bridge the gap between theory and practice between Mingchi and industry. The department also publishes in Chinese a quarterly titled "Industrial Design."

An unstructured interview was conducted when the authors met the two fifth year students (L and T) and their supervisor (C) from the Industrial Design Department. L and T completed their fifth off campus study in October of 1996. This study period lasted two and a half months--from July 24 to October 9.

Both L and T participated in general training, such as data processing, parking lot management, document or patient delivery, in FPG companies, hospitals, or factories from their first to fourth off campus periods of study. That is, they were general student workers. However, they were lucky enough to participate in professional training in their fifth off campus study period. L was trained in product development, graphic design, fashion design, etc., and T was trained in designing product instructions, catalogues, logos, posters, etc. They pointed out that some specialty courses which they completed, such as Basic 2-D Design, Design Sketch, Product Drawing, Color Theory and Applications, Graphic Design, and Market Survey, were helpful for their learning tasks, which focused on 2-D design. They also mentioned that other students in their class were placed in many different cooperating units and experienced general training. Their learning experiences varied and depended on the assignments of the cooperating units. Some of L and T's classmates complained that their learning tasks were too labor-intensive.

On the whole, L and T were satisfied with the off campus study program. They highly valued their five opportunities for off campus study, which helped them to realize how businesses or factories are run. They believed these experiences were good for their transition from school to society and the world of work in the future. Thus, L and T pointed out that it will be better for students' learning if seniors may experience more

professional training. However, they did not criticize the general training, in which they played the role of student worker. C, who is L and T's supervisor, explained that cooperating units usually focused on productivity and did not pay much attention to the nature of Mingchi students' training needs. As a result, many cooperating units provided students with general training opportunities which seemed not to have a close relationship with productivity. C also emphasized that, among the five departments in Mingchi, it is hardest for the students in the Industrial Design Department to be placed in professional training jobs at FPG since FPG companies are mainly connected with the chemical industry at this time. Thus, in order to expand opportunities for professional training, cooperating firms other than FPG companies should get involved.

Based upon the above literature review and interviews, it is concluded that Mingchi's off campus study program is efficient. This more than 30-year-old program reaches its pre-set goal of helping students to learn by working. From the viewpoint of career development, the program at least enriches students' career exploration and career orientation opportunities. From the perspective of effectiveness, Mingchi's off campus study program is on the right track. However, students will learn more and better if Mingchi and its partners may arrange more profession-oriented and more individualized work-based learning opportunities in the off campus program.

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Footnotes

[1]The specialty courses offered in the Industrial Design Department are as follows:

專業課程 Design Courses

第1學年 Year 1		第2學年 Year 2		第3學年 Year 3		第4學年 Year 4		第5學年 Year 5	
上學期 1st Semester	下學期 2nd Semester	上學期 1st Semester	下學期 2nd Semester	上學期 1st Semester	下學期 2nd Semester	上學期 1st Semester	下學期 2nd Semester	上學期 1st Semester	下學期 2nd Semester
				10 341 設計史 History of Design		10 441 設計方法 Design Methods	10 442 創造工學 Creative Engineering	10 541 系統設計概論 Introduction to Systems Design	10 542 設計專論 Design Seminar
				10 371 色彩原理與應用 Color Theory and Applications	10 372 色彩原理與應用 Color Theory and Applications				
				10 373 人因工程 Human Factors Engineering	10 374 人因工程 Human Factors Engineering	10 461 統計方法 Statistical Methods	10 462 市場調查 Market Survey	10 561 產品分析 Product Analysis	10 562 工業包裝 Industrial Packaging
		10 231 工廠實習 Maching Shop Practice	10 232 工廠實習 Maching Shop Practice	10 331 綜合工廠實習 Design Workshop Practice	10 332 綜合工廠實習 Design Workshop Practice	10 431 材料與加工 I Materials & Processing	10 432 材料與加工 I Materials & Processing		
					10 352 攝影學 Photography	10 451 商業攝影 Commercial Photography	10 452 印刷設計 Graphic Design	10 551 陶瓷設計 Ceramic Design	10 544 設計概念 Design Concepts
10 141 工業設計概論 Introduction to Industrial Design	10 142 工業設計概論 Introduction to Industrial Design	10 221 設計素描 Design Sketch	10 222 設計素描 Design Sketch	10 321 表現技法 Presentation Techniques	10 322 表現技法 Presentation Techniques	10 421 產品彩繪 Product Rendering	10 422 產品彩繪 Product Rendering		
10 111 機學 Mechanical Drawing	10 112 機學 Mechanical Drawing	10 211 設計畫學 Design Drawing	10 212 設計畫學 Design Drawing	10 311 產品製圖 Product Drawing	10 312 產品製圖 Product Drawing	10 481 工程力學 Engineering Mechanics	10 482 電工學 Electrical Engineering	10 581 模具概論 Introduction Molding	10 582 機構設計 Mechanism Structure
10 101 平面基礎 Basic 2-D Design	10 102 平面基礎 Basic 2-D Design	10 201 立體基礎 Basic 3-D Design	10 202 立體基礎 Basic 3-D Design	10 301 基本產品設計 Basic Product Design	10 302 基本產品設計 Basic Product Design	10 401 產品設計 Product Design	10 402 產品設計 Product Design	10 501 專題設計 Senior Design Projects	10 502 專題設計 Senior Design Projects

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